60p

THE Unexplained

MYSTERIES OF MIND SPACE & TIME

95

Inside the Sun
Merfolk: a fishy tale?
Tension mounts at Borley
New Testament miracles
Spirit photographs

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THE Unexplained
MYSTERIES OF MIND SPACE & TIME

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In next week's issue
Strange dirigibles were reported from all over Britain in 1909; in **British scareships** we analyse these reports – and the dismissive reaction of the authorities. Was there a cover up? Or did no one know what these airships were? The first article in a new series on **Divination** looks at the ancient art of geomancy and asks: how can random holes in the ground possibly indicate the direction of one's future? The controversy over **Borley Rectory** still rages – but some of the apparently paranormal phenomena that take place there can be tested. In **Alternative healing** we look at the increasingly popular practices of healing by touch, massage and manipulation. And in **Holy blood, Holy Grail** Christ's crucifixion is reviewed; did he really die on the cross – or was that only early Christian propaganda?
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Unexpected developments

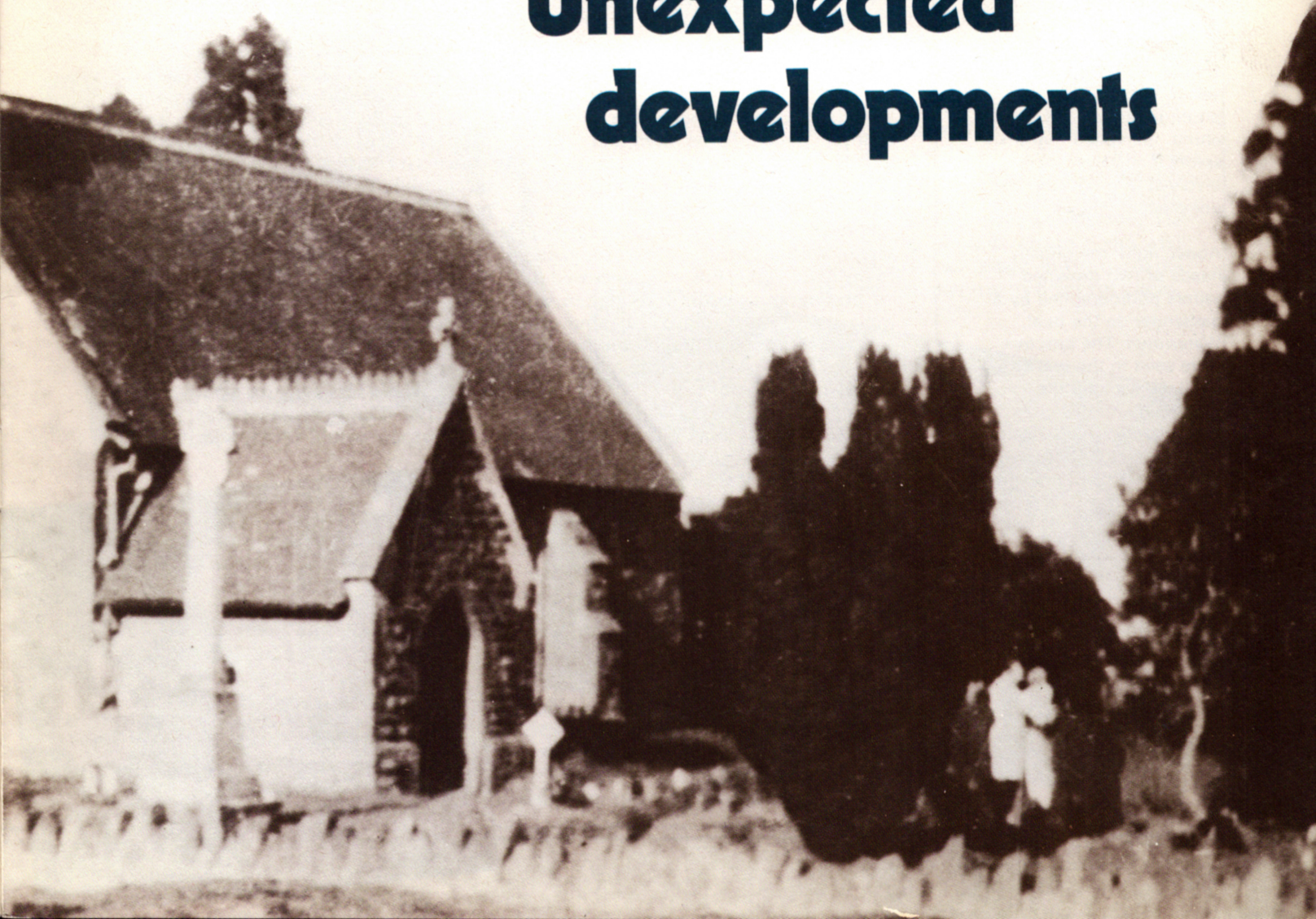
A spectral figure has often turned up on a photograph when nothing of the kind was visible at the time it was taken. How do these 'extras' appear? Are they genuine? FREDERICK GOODMAN focuses on spirit photography

THE EASE WITH WHICH 'EXTRAS' may be imposed upon photographs has led most people to believe that all spirit photographs are in some way fraudulent. However, the evidence suggests otherwise. While the greater number of so-called psychic pictures are indeed intended to amuse or defraud, a few spirit photographs have been made in circumstances that place them on a level beyond ordinary understanding. What makes the discussion of spirit photography so difficult is that no one knows how genuine images come to be on plates and film. And no one knows exactly what these spirit images are.

The most extraordinary spirit photographs have been made in seances, often under rigid test conditions, but a few interesting ones have been made unexpectedly by amateurs. People take a snapshot of a friend, or of an interior, or of a pet, and afterwards find, to their astonishment, the image of a face or figure – sometimes recognisably that of a deceased relative or friend – on the print. This happens rarely, but it does happen; and many examples, with written accounts, have been preserved by archivists and librarians interested in psychic phenomena. The earliest preserved examples of spirit photographs were of this order: they were taken by amateur photographers who had no specialist interest in psychic effects, and who indeed were disappointed that their portraits and landscapes were 'spoiled' by extra images.

It is generally accepted that spirit photography as such began in Boston, Massachusetts, USA, on 5 October 1861, when William Mumler accidentally produced his first spirit picture. But this date may not be entirely accurate. For, according to an early pioneer of Spiritualism in Boston, Dr Gardner, a few portraits exhibiting a second figure that could not be accounted for had been made before that at nearby Roxbury. The Roxbury photographer was an 'orthodox Christian' who, after hearing about Mumler's pictures, refused to print any negatives containing 'spirits' on the grounds that 'if it had anything to do with Spiritualism, it was the work of the Devil.'

The fact is that, well over a century later, we still do not know how spirit photography



An embracing couple not seen by either the photographer or the subject (far left) appeared on this picture taken in a churchyard in 1928 by a Mrs Wickstead. The 'spirits' could not be identified – and the Society for Psychical Research, who investigated the matter, could not explain them

actually works. The majority of psychical researchers involved with spirit photography claim it occurs by the direct intervention of the spirits themselves. By such reasoning, of course, the result is not so much 'spirit photography' as 'photography by spirits'. The famous journalist W. T. Stead was an early champion of spirit photography, and many portraits of him show images of recognised extras alongside. After he died in the *Titanic* disaster in April 1912, he continued to converse in spirit with his daughter Estelle, as she reported. And then the matter went further, for his image began to appear as an extra alongside her in pictures. When Estelle asked him to say something about the actual production of such psychic photographs, Stead insisted that the spirits were themselves involved with producing the images – mainly in order to convince people of the reality of life after death.

The spirit photographs made by professionals and participants in seances are fascinating enough. But it is the innocence and the element of the unexpected that permeate the accidental spirit photographs of amateurs that intrigue the historian of the genre more.

Perhaps the most famous of the early

Above: a spirit portrait of William T. Stead, who had died in the *Titanic* disaster, with his living daughter Estelle. According to her, she asked him how psychic photography actually came about; he replied that the spirits themselves were involved in producing the unexpected images

Above right: the ghostly heads of two drowned sailors photographed by a passenger on the boat, *Watertown*. The spectres were seen in the waves for several days after the drowning and the photographer deliberately took the picture to record this psychic phenomenon

Negative findings

The faking of spirit photographs seems to have begun almost as soon as the genuine product appeared in the 19th century. One of the common faking techniques was the double exposure – marginally easier with the large plates then in use. A more cunning method involved the painting of a background screen with a special chemical invisible to ordinary sight, but which showed up on photographic film. This screen was pre-painted and placed behind the sitter. Still other techniques were devised by ingenious and unscrupulous photographers.

The case called the 'Moss photographic fiasco' is among the most interesting of the proven frauds. In the early 1920s, G.H. Moss was employed as a chauffeur by a man who was interested in the paranormal. Moss was an amateur photographer, and one day he brought a print with a ghostly 'extra' to his employer. The employer showed interest and, after some experiments on his own, introduced Moss into the British College of Psychic Science. About 1924, Moss was given a year's 'contract' to work under test conditions at the college, on a fixed salary. His work there was impressive and well-received – until he was exposed as a fraud.

Moss produced a number of spirit images that were recognised as the likenesses of dead relatives and friends by sitters. In one of these (below) the sitter was a trance medium. She recognised the extra as her dead sister. A cut-out photograph of that sister was mounted alongside the extra to illustrate the resemblance. In another (right), the image was recognised by a person observing the photographic session, though it was not clear whether the recognised spirit was dead or alive.

A third example of Moss's work (far right) was made in a seance with the well-known medium Mrs Osborne Leonard on 5 January 1925. The sitter was informed by 'a voice from beyond' that he would be sitting for a photograph in 8 days. The invisible speaker promised that she would reveal herself then.

examples of amateur spirit photography is the 'Lord Combermere's ghost' picture (see page 574). The circumstances surrounding the taking of this photograph have been well-recorded and documented. The picture was a study of the splendid library in Combermere Abbey, Cheshire, taken by Miss Sybell Corbet in 1891 as a souvenir of her visit. She was surprised, if not disappointed, to discover on the plate the transparent image of an old man sitting in a chair at the left of the room.

Only the head, the body and arms of the figure are relatively clear – the legs are missing. Subsequent research by psychical investigators revealed that at the precise time that the plate was being exposed, the body of Lord Combermere was being buried in the local churchyard at Wrenbury, a few miles away from the abbey. Lord Combermere had died in London a few days previously as a result of a road accident. In this accident his legs had been so badly damaged that, had he lived, he would never have walked again.

The touch of drama that characterises this photograph came to light well after it was taken. Indeed only rarely do amateur photographers take pictures in the knowledge that they are recording psychic phenomena. One of the few exceptions is the case of the *Watertown* pictures, which contain images of drowned seamen. These were deliberately taken by one of the passengers on board a boat, the *Watertown*, from which two seamen had been swept overboard and drowned during the course of the journey. For several days afterwards, passengers and crew insisted that the seamen's spectral heads could be seen in the waves and spray.

Much more typical is the account of the curious extras on a snapshot taken by Mrs Wickstead in 1928. The snapshot – now quite faded, but never of first-rate quality – was one of two taken at the church in the village of Hollybush, not far from Hereford. Mrs Wickstead was on a car tour with friends and had stopped to see the church. She decided to take a photograph of her friend Mrs Laurie, who, in the event, can barely be seen in the photograph. After the picture had been taken, Mrs Laurie drew Mrs Wickstead's attention to the grave of a soldier who had died in service. Alongside this grave was one of a girl who had died shortly afterwards.

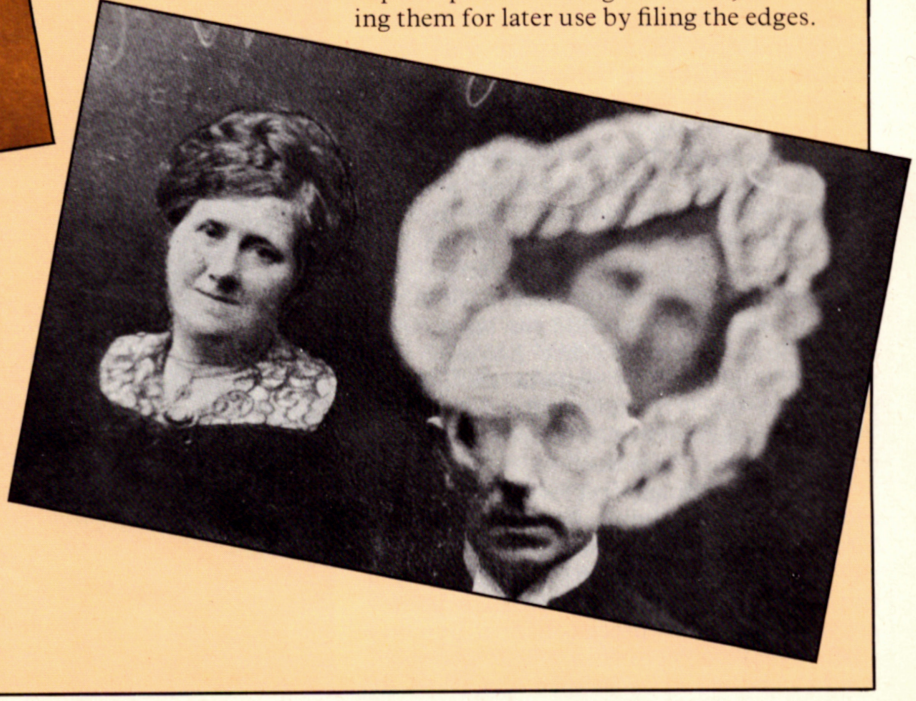
'I wonder if they were lovers?' Mrs Laurie had asked.

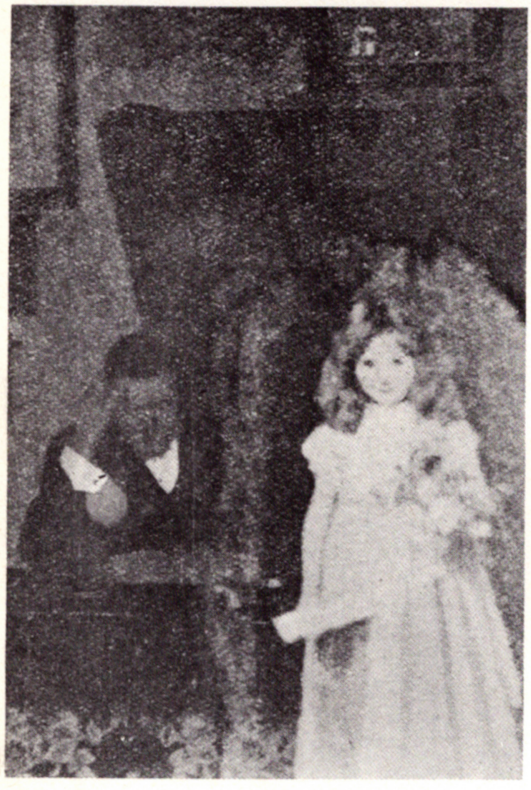
In a letter to Sir Oliver Lodge, later

That sitting, which had already been arranged without Mrs Leonard's knowledge, did indeed produce an extra – and some of the sitter's friends insisted that the image bore a strong likeness to his recently deceased wife. A portrait of her was pasted alongside so that a comparison could be made.

Moss was unmasked by the astute F. Barlow, at that time the Honorary Secretary for the now defunct Society for the Study of Supernormal Pictures. While Barlow was examining a group of Moss's negatives containing extras, he noticed a roughness on the edges of certain plates. Closer examination showed that each negative bearing a spirit image had one edge filed. Detailed examination of the plate wrappings revealed that they had been skilfully opened by steaming and resealed.

Moss vehemently denied fraud and even signed a statement declaring his innocence. However, when faced with the filed plates, he made a confession. He had secretly opened certain plates and superimposed an image on them, marking them for later use by filing the edges.





president of the Society for Psychical Research (SPR), Mrs Wickstead wrote that Mrs Laurie had seemed impressed by the two graves and had made a point of showing them to her husband. 'We thought no more about it until about six weeks later when the film was developed and came out as you see with these two figures on the path in the shadow of the yew tree,' Mrs Wickstead wrote. The two figures were in an embrace. The picture was investigated by the SPR, but the mystery of the extras was never solved.

Invisible spirits

There have been rare cases of sensitives seeing and photographing spirits that have remained invisible to others present. One famous example of this is known as the 'Weston' photograph.

The Reverend Charles Tweedale and his family lived in Weston vicarage, a much haunted house in the town of Otley in West Yorkshire. While having lunch on 20 December 1915, Mrs Margaret Tweedale saw the apparition of a bearded man to the left of her son. The others around the table could see nothing. However, her husband immediately fetched the camera and took a picture of the area indicated by his wife. When the negative was developed, a portrait of the apparition appeared on the print.

One extraordinary picture session that took place in Belgium seems to support the belief that the spirits intervene directly in psychic photography. In this instance, a spirit actually instructed an amateur photographer in the most precise manner how and when to take a picture in which the spirit would manifest. The picture was taken by Emile le Roux in 1909, and is one of the very few stereoscopic spirit photographs.

The instructions came from a spirit who claimed to be the uncle of le Roux's wife. The spirit made contact through her when she was practising automatic writing in le Roux's presence. Through the automatic script, the 'uncle' said that he could be photographed at a later point in the day and gave instructions as to the time and the exposure. Le Roux, a keen amateur photographer, considered the exposure to be far too long; but he followed instructions and took the picture with his stereoscopic camera at the time indicated. The image of the deceased uncle not only appeared but was quite recognisable. In its day, the plate became very famous – but time after time le Roux had to defend himself against the usual charges of fraud. His own simple words reveal the recurrent story of the amateur caught up in a process that he or she cannot explain:

> In reality, this photograph was made under the most simple circumstances, and I would say that except for the strangeness of the spirit head, there were so few difficulties both before and after its execution that, in spite of the

Above left: the spirit of a dead child appears with her father on a portrait taken by Dr Hooper, a clairvoyant. Hooper claimed that he saw the girl when he took the picture, though she was invisible to others present

Above: an 'extra' of Madame le Roux's uncle appeared on this picture of her, taken by her husband during an automatic writing session. Through the script, the spirit gave instructions on taking the photograph

Left: an unidentified extra in Gloucester Cathedral taken about 1910

Above right: a picture of a bottle allegedly made by the direct transfer of a thought onto a photographic plate in 1896 – called a 'thought-photograph' before the word 'thoughtography' came into use. It was made in France by a Commandant Darget

Right: the ghost of a woman, dead a week, is seen in the back seat in a picture taken by her daughter. Experts said the photograph had not been tampered with

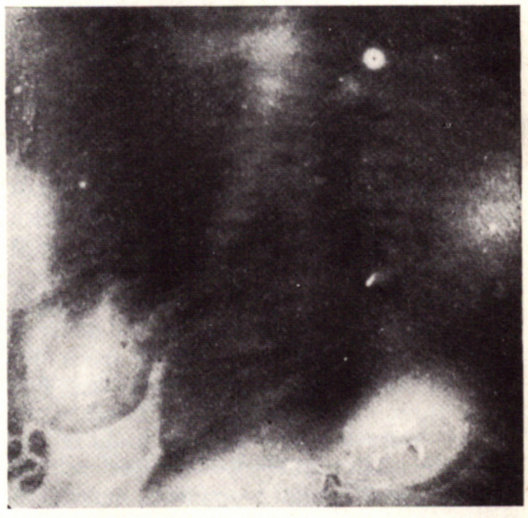
scepticism which arose within me, and which has not yet quite vanished, I am forced to admit that in order to explain this negative it is necessary to look in another direction than 'fraud' or the double exposure of the plate.

This tantalising image of the deceased uncle is stereoscopically adjusted for depth – an indication that, photographically at least, the psychic entity is subject to the same optical laws as a living being.

The subject of spirit photography greatly excited psychical investigators in the 1870s and 1880s, but no organised and sustained study seems to have been made. There are many references to the phenomenon in the *British Journal of Photography* and a number of articles in the *Journal* of the SPR. But the issue was clouded by the controversy over Spiritualism and no undistorted and full treatment of psychic photography itself has come down to us.

In any event, psychic photography did not end with the unexplained appearance of spirit forms on prints. One new form that has emerged in recent times is the manifestation of UFOs. And, since the main question is whether images on film can be produced without optical processes, thoughtography is of relevance too.

The term 'thoughtography' came into use in Japan in 1910 following a series of tests by Tomokichi Fukurai of a clairvoyant who accidentally imprinted a calligraphic character on a photographic plate by psychic means. Later the sensitive was able to do this by concentrated effort. Fukurai's work was



published in English 20 years later and some experiments similar to his were then undertaken in Europe and the United States. But it was not until 1962 that interest in thoughtography was activated by Pauline Oehler, of the Illinois Society for Psychic Research, through her work with the American psychic Ted Serios

Serios was much investigated under strictly controlled conditions, particularly by Dr Jule Eisenbud (see page 710), a psychical researcher working mainly in Denver, Colorado, USA. In many experiments planned by Eisenbud over a period of two years, Serios could at will produce pictures of what he was thinking about – an old hotel, cars, a corner of a room, and many other mental images. He could also produce an image of a target set by himself or others. For example, one day he glanced casually at a travel magazine in Eisenbud's waiting room. The next day he decided to produce a picture of Westminster Abbey, which he had noticed in the publication. And he did so.

Thoughtography has since become an integral part of modern psychical research. And although Serios's ability to transfer his thoughts onto film has never been explained, neither has it ever been proved fraudulent.

Among the professional spirit photographers of the late 19th century, however, there were undoubtedly frauds – and a number of them were exposed. But does that negate the important fact that many photographic images have been produced by paranormal means?

Not all professional spirit photographers were frauds. We give the evidence on page 1930

His wonders to perform

Levitation, psychokinesis, ESP and paranormal healing are all, apparently, described in the New Testament. But did the conventions of the gospel writers obscure the facts? Were they as miraculous as reported? DAVID CHRISTIE-MURRAY investigates

IF JESUS WAS GOD incarnate, as Christianity teaches, his life could scarcely be expected to be anything but miraculous. Beginning with a virgin birth (a claim not made for him until after his death), an event surrounded with portents – as was the birth of his cousin, John the Baptist – the Bible implies that he lived an uneventful life until he was about 30. Then he burst on his world like a meteor. For some three to four years he taught and worked miracles in Palestine and, if the records can be believed, whatever else he was, he was the greatest and most beneficent healer who has ever lived. By his followers he came to be recognised as the all-conquering Messiah whose coming had been foretold by the prophets. They could not, however, accept his teaching that his kingdom was spiritual, not political, and they were appalled when he went unresisting to execution. To the members of the Jewish religious establishment whose authority he challenged he was a dangerous upstart who might cause trouble with their political masters, the Romans. According to the gospels, the climax came at the Passover festival, when the chief priests allied with an unwilling Roman governor to bring Jesus to crucifixion.

That should have been the end of it. But, at the next great feast, Pentecost, his followers proclaimed that Jesus had risen – in his physical body – from the dead. They then went out into the world and preached with such conviction that within a decade the new religion of Christianity had permeated almost the entire Roman Empire.

In assessing miraculous events as reported in the New Testament, three elements need to be considered – the records, the truth or falsehood of the facts chronicled and their interpretation.

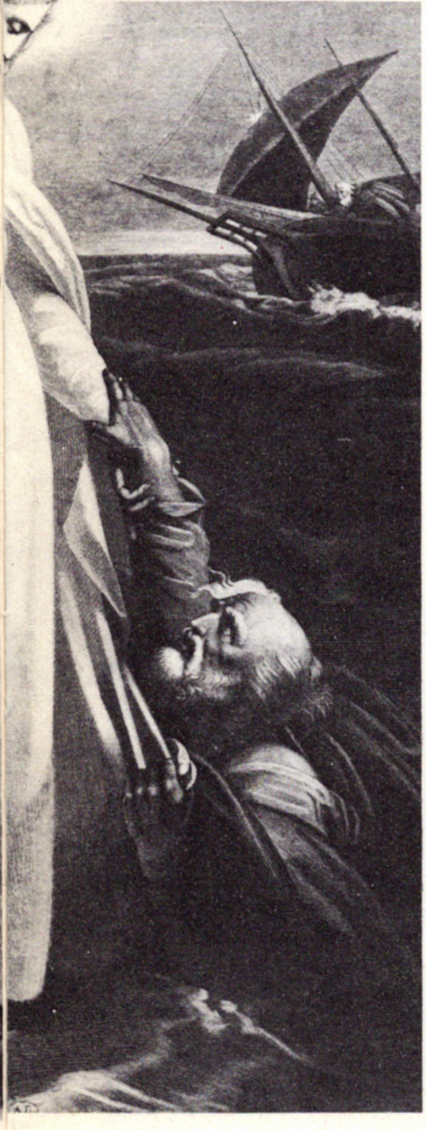
First, the records. Apart from a few fragments, the oldest New Testament manuscripts date back to about the fourth century AD and are copies of copies. Part of the work of textual scholars is to reconstruct the original texts by comparing and collating surviving manuscripts and eliminating the inaccuracies, additions and annotations of copyists. Mark's gospel was written about AD 65, approximately 30 years after the events recorded, Luke's probably about AD 70, Matthew's late in the first century and John's about AD 100. They were based on earlier written material, in turn collected from oral tradition and statements of eyewitnesses, contemporaries of Jesus. Mark probably

Right: the gospel writers. Mark's gospel was written about 30 years after the events it recorded, Luke's shortly after that; Matthew and John's gospels were probably written around the end of the first century. Were their memories hopelessly muddled after such a long time – or were the events they recorded too amazing to forget?

Below right: Peter raises the dead Tabitha; early Christian propaganda or literal truth?

Right: a conventional Nativity scene, complete with adoring magi and heavenly choir, typical of the Midrash, or embroidered scriptural commentary. Angels appearing to shepherds, and the star of Bethlehem are, say biblical scholars, attempts by the gospel writers to create an atmosphere appropriate for the birth of the Son of God. Yet, if that were the true identity of Jesus of Nazareth, why should 'signs and wonders' not have accompanied his birth?

Far right: Jesus walks on the water, while Peter begins to sink the moment he takes his eyes off Jesus's face. Is this another example of the Midrash style – or did Jesus hypnotise Peter, releasing paranormal powers?



obtained information from Peter, leader of the Apostles, and Luke from Mary, Jesus's mother. Sceptics may therefore claim that the fallibility of memory and the unconscious exaggeration of each other's recollections by enthusiastic believers can explain away everything, and that records written so long after the events are worthless. Believers can argue that the records were based on the recollections of contemporaries of Christ, that events so astounding would imprint themselves upon the memory, that mere illusion could not have transfigured lives and made the impact on history that Jesus's career did, and that the most scholarly investigation by hostile critics has not succeeded in destroying the main fabric of the New Testament story, including its paranormal elements.

Star of wonder

In judging the records the writing conventions of the time must be considered. Ancient narratives were not as obsessed as 20th-century journalists with the literal accuracy of words and the reporting of events – the interpretation was more important than the happening, and their readers understood this. Thus Matthew, a Jewish Christian writing for Jews, used the technique of the Midrash, or embroidered commentary. This technique poetically and symbolically enhanced events that were, perhaps, wonderful in themselves, creating a suitable atmosphere to convey the wonder to the reader. So, the birth of Jesus was accompanied by the appearance of angels to shepherds, the star over Bethlehem and the visit of the wise men from the East. An earthquake, the rending of the Temple veil, darkness and the appearance of spirits in the streets of Jerusalem signalled the death of Jesus. None of these events may have actually happened, but for all believers, what matters is not the physical events men experience but the spiritual experiences they symbolise.

Matthew also emphasises the fulfilment of prophecy, a favourite phrase being, 'that it might be fulfilled which was spoken by the prophets'. However, for 'fulfilled' read 'paralleled', for a rabbinical tradition was to quote Scripture as commentary; as when a rabbi, given a basin of oil in which to wash his feet, commented, 'that it might be fulfilled what is written in Deuteronomy, "let him dip his feet in oil".'Matthew never intended – any more than the rabbi – to state that the prophets foresaw the actual events.

Intervention of angels

Another Jewish convention is the device of ascribing the apparent intervention of God in the affairs of men to the action of 'an angel of the Lord'.

Prediction and precognition have a place in the New Testament but only, research reveals, as a matter of faith. Jesus predicted his death at Jerusalem at least three times. He prophesied the obliteration of the Temple, which occurred in AD 70. He foresaw Peter's denial of him. Agabus, a Christian prophet, warned Paul that the Jews of Jerusalem would deliver him to the Romans (Acts 21:9). But the records of these predictions were all written *after* their apparent fulfilment and are therefore useless as evidence for the power of prediction.

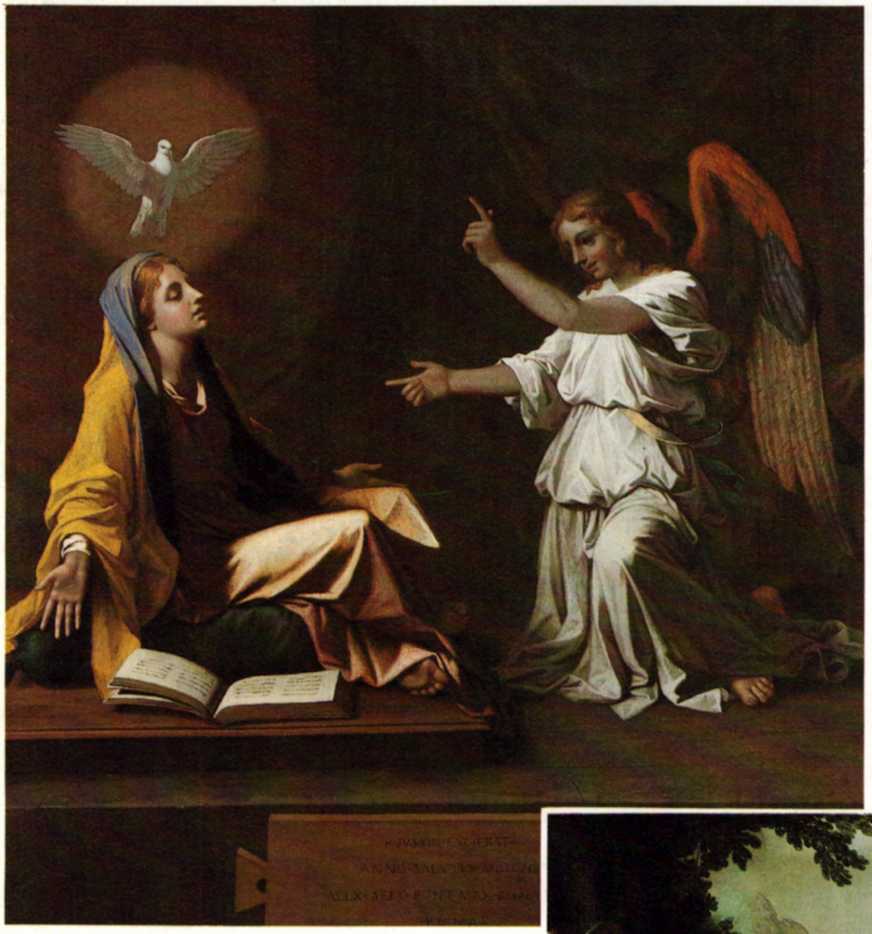
Mystical experiences, dreams and visions

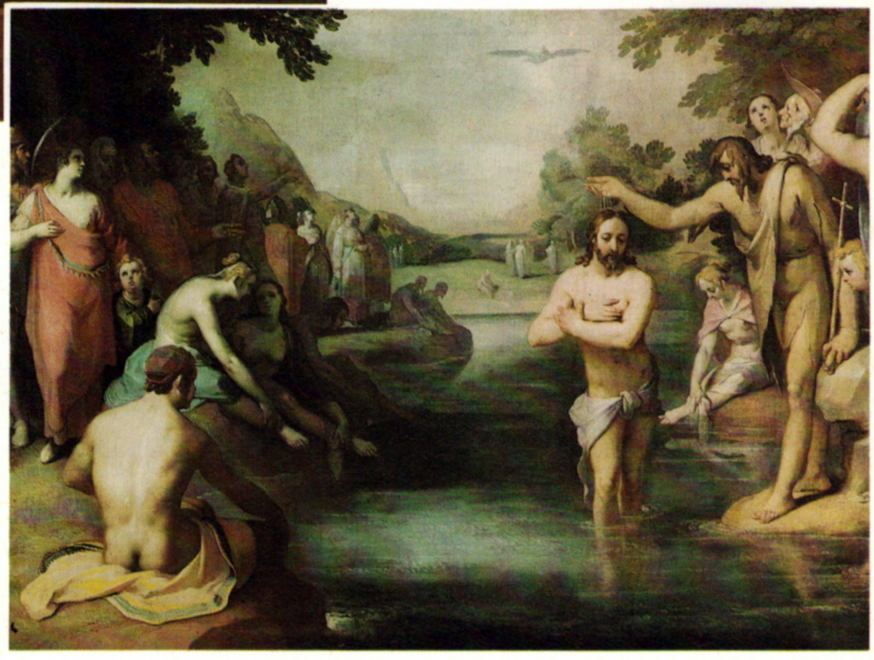
abound. If the dreams of Joseph, Mary's husband (Matthew 1:20; 2:13; 2:19; 2:22), are not Mishradic, they can be accepted as dramatisations of solutions to problems of which he was aware when awake. Jesus, at his baptism, saw the heavens open, the Holy Spirit descending upon him like a dove and heard a voice saying, 'Thou art my beloved Son,' all of which was, apparently, personal to him. No bystander is reported as having seen or heard anything. Paul's conversion occurred when a light from heaven (lightning?) temporarily blinded him on a journey to Damascus and a voice addressed him. Acts 9:7 claims the voice was heard by Paul's companions while Acts 22:9 denies this. The discrepancy cannot be denied – but neither can the fact that the arch-persecutor of the Christians became, as a result of his experience, their principal advocate. There is also a possible psychological explanation. Watching the heroic death of the first Christian martyr, Stephen (Acts 7), Saul – later Paul – was subconsciously convinced of the truth of Christianity. The conviction violently conflicted with his upbringing as a rigorous Pharisee, and the conflict had to be resolved by a cataclysmic personal experience.

More than psychology, however, is needed to explain the experience of Peter and Cornelius. Cornelius, a Roman centurion, given Peter's very name and address in a vision, sends for him. Peter, forbidden by Jewish law to enter a gentile's house, has a vision of creatures 'clean' and 'unclean'. Told to 'kill and eat', he replies that he has never eaten anything unclean. The reply comes, 'Do not call unclean what God has cleansed.' The vision coincides with the arrival of Cornelius's emissaries, and Peter, his scruples removed, visits Cornelius who is converted to Christianity – and the new faith is for the first time communicated to the gentile world (Acts 10).

Below: an angel announces to Mary that she will bear the 'Son of the Highest'. The Holy Ghost is shown here as a dove – a symbol of God's especial favour – which is also mentioned in the New Testament description of Jesus's baptism (bottom)

Below right: Peter is freed from his chains by an angel. Is this an example of the Apostle's own PK ability activated by his dire need?





The go-between

The psychical researcher can see in this story an unusual case of extra-sensory perception, the Roman's thoughts reaching out to the Jew and inspiring the reflection expressed in a vision that the whole of humanity was acceptable to God. But there is an extra dimension in that the communications are inspired by something or someone beyond the two men, an 'angel' who instructs Cornelius and a 'voice' that addresses Peter. Some parapsychologists, however, believe that this sort of disembodied voice may be an exteriorisation of one's own inner conviction – in effect, one literally hears not merely what one wants to hear but what one *needs* to hear. Thus the Apostles heard 'divine' voices at critical moments in their lives. Rex G. Stanford's theory of 'psi-mediated instrumental response' (PMIR) embraces the idea that prayers are answered, not by any outside agency, but by the person who prays, through the unconscious activation of a form of psychokinesis, but only when the need is greatest (see page 1620).

The delivery of Peter from prison, when he was sleeping chained between two guards, is frankly miraculous (Acts 12); but the story has a ring of truth about it and is paralleled in the similar release of a modern Christian, Sadhu Sunder Singh in the early 20th

century. This is only one of a number of biblical miracles that although superficially incredible, can be matched by personal experiences today.

During Jesus's mission – a time of great spiritual outpouring – his followers may well have experienced the blossoming of psychic powers. If there is any truth at all in the strange experiences reported by saints and mystics down the ages, these continue to manifest in holy people. Many of the experiences, such as 'speaking with tongues', are explicable psychologically (see page 444), others, such as some of the well-attested healing miracles at Lourdes, are inexplicable.

At the same time a truly balanced view often actively cries out for a healthy and reasonable scepticism. Some of the miracles in the New Testament are ethically suspect – is the striking dead or blind of deceivers and opponents, as Peter did to Ananias and Sapphira (Acts 5) and Paul to Elymas the sorcerer (Acts 13), albeit temporarily – reconcilable with Christ's teaching of 'Love thine enemies'? Was it ethical of the Lord of creation to send evil spirits into a herd of swine (Matthew 8) so that they were all drowned? (Although there is some evidence that this incident was misreported.)

Christians prefer to assess each miracle individually, according to its consonance with the true spirit of Christianity as they see it. Thus, Jesus's calming of the tempest at sea (Matthew 8:24) can be believed of a man so in tune with nature that he could read its signs, and his walking on the sea (Matthew 14:24) as an example of levitation – which has been reputed in different cultures and at different ages to be a property of holy men.

One outstanding characteristic of Jesus's life was his healing ability. The literature of the paranormal is crammed with stories of healing, many of them as well-authenticated as such events can be; and there is no reason why Jesus's reputation as an exceptional healer should not be accepted at face value. His raising from the dead of Jairus's daughter (Matthew 9:18) – of whom he said, 'The maid is not dead, but sleepeth' – and of the widow of Nain's son (Luke 7:11-17) could both have been recoveries from comas. The raising of Lazarus (John 11) is a different matter. Not only is there here a man raised to life four days after his burial, but this astounding miracle – which finally decided the authorities to destroy Jesus – is ignored by the first three gospels. Yet the modern Hindu leader, Sai Baba, is also credited with raising from the dead a man whose body had actually begun to decompose (see page 237).

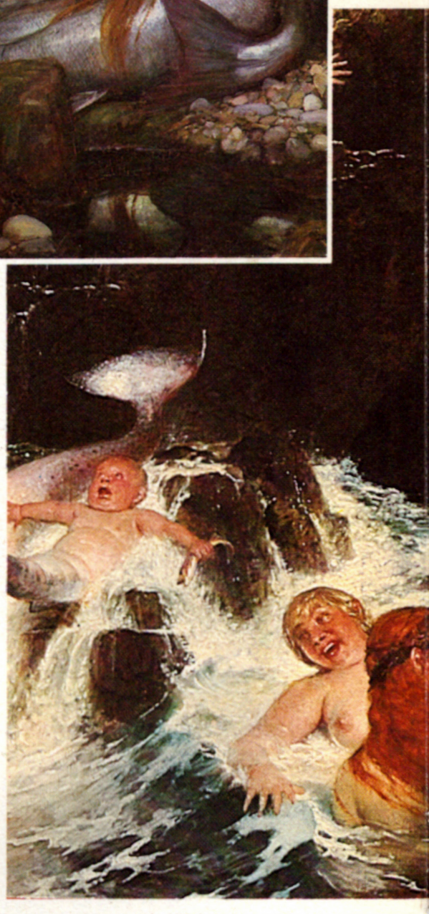
But for Christians, there remains a miracle of raising that, if it happened, must be the most remarkable and significant event of all time: the physical resurrection of Jesus himself, three days after he died on the cross.

Did Jesus really – as the gospels claim – rise from the dead? See page 1934

Bottom: Lazarus is raised from the dead. Some commentators suggest that Lazarus was in fact in a cataleptic trance, or a coma, and that Jesus, realising this, released him from the appalling fate of being buried – or entombed – alive. Yet in the 1970s, the Hindu leader Sai Baba is said to have 'raised' a man who had been dead for days and who had actually begun to decompose; perhaps Lazarus truly was dead when Jesus raised him

A fishy tale

Half human and half fish, mermaids and mermen have appeared many times over the centuries. But, asks PAUL BEGG, are the merfolk merely colourful figments of our imagination – or do they really exist?



ACCORDING TO THE South African *Pretoria News* of 20 December 1977, a mermaid had been found in a storm sewer in the Limbala Stage III township, Lusaka. The reports are garbled and it is difficult to tell who saw what – and what exactly it was they saw – but it seems that the 'mermaid' was first seen by some children and, as the news spread, so a crowd gathered. One reporter was told that the creature appeared to be a 'European woman from the waist up, whilst the rest of her body was shaped like the back end of a fish, and covered with scales.'

Legends about mermaids and mermen stretch back into antiquity and can be found in the folklore of almost every nation in the world. Merfolk have been seen and vouched for down the ages by witnesses of attested integrity – and they continue to be seen today.

The earliest merman in recorded history is the fish-tailed god Ea, more familiarly known as Oannes, one of the three great gods of the Babylonians. He had dominion over the sea and was also the god of light and wisdom, and the bringer of civilisation to his people. Originally Oannes was the god of the Akkadians, a Semitic people of the northern part of Babylonia from whom the Babylonians derived their culture, and was worshipped in Akkad as early as 5000 BC.

Almost all we know about the cult of Oannes is derived from the surviving fragments of a three-volume history of Babylonia written by Berossus, a Chaldean priest of Bel in Babylon, in the third century BC. In the 19th century, Paul Emil Botta, the French vice-consul in Mosul, Iraq, and an enthusiastic archaeologist – albeit one whose primary concern was loot – discovered a remarkable sculpture of Oannes dating from the eighth century BC, in the palace of the Assyrian king Sargon II at Khorabad, near Mosul. The sculpture, along with a rich collection of carved slabs and cuneiform inscriptions, is now held in the Louvre in Paris.

Another early fish-tailed god was Dagon of the Philistines who is mentioned in the Bible: 1 Samuel 5:1–4. The Ark of the Covenant was placed next to a statue of Dagon in a temple dedicated to Dagon in Ashod, one of the five great Philistine city states. The following day the statue was found to have 'fallen upon his face to the earth before the ark of the Lord'. Amid much consternation and, no doubt, great fear, the people of Ashod set the statue of Dagon in its place again, but the following day it was again found fallen before the Ark of the Covenant, this time the head and the hands having broken off.

It is also probable that the wife and daughters of Oannes were fish-tailed, but the surviving representations of them are vague and it is impossible to be sure. However, no doubts surround Atargatis, sometimes known as Derceto, a Semitic Moon goddess. In his *De dea Syria* the Greek writer Lucian (*c.* AD 120–*c.* 180) described her: 'Of this Derceto likewise I saw in Phoenicia a drawing in which she is represented in a curious form; for in the upper half she is a woman, but from the waist to the lower extremities runs in the tail of a fish.'

Fish-tailed deities can be found in almost every culture of the ancient world but by medieval times they had become humanoid sea-dwellers. One of the most important scientific influences on the Middle Ages was Pliny the Elder (AD 23–79), a Roman administrator and encyclopedic writer who died in the eruption of Vesuvius that destroyed Pompeii (and whose 15th-century statue outside Como Cathedral looks disconcertingly like Harpo Marx). As far as medieval scholars were concerned, if Pliny said that something was so then it was

Top left: the 'Fejee mermaid' that was the star attraction of Phineas T. Barnum's touring show in 1842. Barnum, a cynical American showman who coined the phrase 'every crowd has a silver lining', advertised the creature with posters depicting voluptuous mermaids, similar to the painting by Waterhouse (top). The 'mermaid' was perhaps a freak fish

undeniably so. Of mermaids, Pliny wrote:

> I am able to bring forth for mine authors divers knights of Rome . . . who testifie that in the coast of the Spanish Ocean neere unto Gades, they have seen a Mere-man, in every respect resembling a man as perfectly in all parts of the bodie as might bee. . . .

Why, if the man so perfectly resembled a human, the 'divers knights of Rome' thought they had seen a *mer*man is not clear, but Pliny was convinced that merfolk were real and that they were seen regularly.

Tales of merfolk proliferated and were, oddly, encouraged by the Church, which found it politic to adapt ancient heathen legends to its own purpose. Mermaids were included in bestiaries, and carvings of them were featured in many churches and cathedrals. A fine example of a mermaid carving can be seen in the church at Zennor, Cornwall, on a bench end. It is thought to be about 600 years old and is associated with the legend of Mathy Trewhella, the son of the churchwarden, who one day inexplicably disappeared. Years later a sea captain arrived at St Ives and told how he had anchored off Pendower Cave and seen a mermaid who had said to him: 'Your anchor is blocking our cave and Mathy and our children are trapped inside.' For the people of Zennor the mystery of Mathy's disappearance was explained.

Above: the mermaid who is said to have abducted one Mathy Trewhella, carved for posterity on a pew in the church at Zennor, Cornwall. The carving is about 600 years old, but the legend may be considerably older

Left: mermaids, mermen and mer-children disport themselves in the turbulent sea

Below: the mermaid as erotic fantasy figure. She was widely believed to prey on drowning sailors, making them her sexual slaves

On the whole, mermaids were not a sight to be relished. Their beautiful song, it was said, had captivated many a ship's crew and, like the fabled sirens, lured vessels to grief on dangerous rocks.

When mermaids surface

In the late Elizabethan, early Jacobean age belief in the mermaid waxed and waned. Men such as Frances Bacon and John Donne gave rational explanations for many natural phenomena, including the mermaid – yet it was also a time of blossoming maritime travel and some of the great seamen of the age told of personal encounters with merfolk. In 1608 Henry Hudson, the navigator and explorer (after whom the Hudson Bay territories are named), made the following matter-of-fact entry in his log:

> This morning, one of our companie looking over boord saw a Mermaid, and calling up some of the companie to see her, one more came up, and by that time she was come close to the ship's side, looking earnestly on the men: a little after, a Sea came and overturned her: From the Navill upward, her back and breasts were like a womans (as they say that saw her) her body as big as one of us; her skin very white; and long haire hanging down behinde, of colour blacke; in her going downe they saw her tayle, which was like the tayle of a Porposse, and speckled like a Macrell. Their names that saw her were Thomas Hilles and Robert Raynar.

Hudson was a very experienced seaman who surely knew the calibre of his men and presumably would not have bothered to record a blatant hoax. Also, the report itself shows that his men were familiar with the creatures of the sea and were of the opinion that this creature was exceptional – which, if their description is accurate, indeed it was.

But the great age for mermaids was the 19th century. More mermaids were faked and displayed to awed crowds at fairs and exhibitions than at any other time. It was also the period in which several remarkable sightings were reported, including two of the best authenticated on record.

On 8 September 1809 *The Times* published the following letter from one William Munro:

> About twelve years ago when I was Parochial Schoolmaster at Reay

Left: a mermaid cornice decoration in Sens Cathedral, France

Below: the sirens attempt to lure Ulysses and his crew to their doom with their irresistible singing. Seen here as mermaids, they are more often thought of as half woman, half bird (below right)

Bottom: a predatory mermaid seizes a sailor and carries him off to her lair

> [Scotland], in the course of my walking on the shore at Sandside Bay, being a fine warm day in summer, I was induced to extend my walk towards Sandside Head, when my attention was arrested by the appearance of a figure resembling an unclothed human female, sitting on a rock extending into the sea, and apparently in the action of combing its hair, which flowed around its shoulders, and of a light brown colour. The resemblance which the figure bore to its prototype in all its visible parts was so striking, that had not the rock on which it was sitting been dangerous for bathing, I would have been constrained to have regarded it as really a human form, and to an eye unaccustomed to the situation, it most undoubtedly appeared as such. The head was covered with hair of the colour above mentioned and shaded on the crown, the forehead round, the face plump, the cheeks ruddy, the eyes blue, the mouth and lips of natural form, resembling those of a man; the teeth I could not discover, as the mouth was shut; the breasts and abdomen, the arms and fingers of the size of a full-grown body of the human species, the fingers, from the action in which the hands were employed, did not appear to be webbed, but to this I am not positive. It remained on the rock three or four minutes after I observed it, and was exercised during that period in combing its hair, which was long and thick, and of which it appeared proud, and then dropped into the sea. . . .

Whatever it was that William Munro saw and described in such detail, he was not alone, for he adds that several people 'whose veracity I never heard disputed' had claimed to have seen the mermaid, but until he had seen it himself he 'was not disposed to credit their testimony'. But, as they say, seeing is believing.

In about 1830 inhabitants of Benbecula, in the Hebrides, saw a young mermaid playing happily in the sea. A few men tried to swim out and capture her, but she easily outswam them. Then a little boy threw stones at her, one of which struck the mermaid and she swam away. A few days later, about 2 miles (3 kilometres) from where she was first seen, the corpse of the little mermaid was washed ashore. The tiny, forlorn body brought crowds to the beach and after the corpse had been subjected to a detailed examination it was said that:

> the upper part of the creature was about the size of a well-fed child of three or four years of age; with an abnormally developed breast. The hair was long, dark and glossy; while the skin was white, soft and tender. The lower part of the body was like a salmon, but without scales.

Among the many people who viewed the tiny corpse was Duncan Shaw, factor (land agent) for Clanranald, baron-bailie and sheriff of the district. He ordered that a coffin and shroud be made for the mermaid and that she be peaceably laid to rest.

Of the many faked merfolk of this period, only one or two need be mentioned to

Below right: the Reverend Robert S. Hawker, who, in his youth, impersonated a mermaid off the shore of Bude, Cornwall. For several nights he draped himself over the rocks, with plaited seaweed for hair and oilskins wrapped round his legs, and sang off-key. The citizens of Bude flocked to see the 'mermaid' but, tiring of his joke, Hawker launched into *God save the King* and dived into the sea – his mermaid days over

illustrate the ingenuity of the fakes and the fakers. A famous example is recounted in *The vicar of Morwenstow* by Sabine Baring-Gould. The vicar in question was the eccentric Robert S. Hawker who, for reasons best known to himself, in July 1825 or 1826 impersonated a mermaid off the shore of Bude in Cornwall. When the Moon was full he swam or rowed to a rock not far from the shore and there donned a wig made from plaited seaweed, wrapped oilskins around his legs and, naked from the waist upwards, sang – far from melodiously – until observed from the shore. When the news of the mermaid spread throughout Bude people flocked to see it, and Hawker repeated his performance. After several appearances Hawker, having tired of his joke – and his voice a little hoarse – gave an unmistakable rendition of *God save the King* and plunged into the sea – never to appear (as a mermaid) again.

Phineas T. Barnum (1810–1891), the great American showman to whom are attributed two telling statements – 'There's one [a sucker] born every minute' and 'Every crowd has a silver lining' – bought a mermaid that he had seen being shown at a shilling a time in Watson's Coffee House in London. It was a dreadful, shrivelled-up thing – probably a freak fish – but Barnum added it to the curiosities he had gathered for his 'Greatest Show on Earth'. His trick, however, was to hang up outside his 'mermaid' sideshow an eye-catching picture of three beautiful women frolicking in an underwater cavern; under this he had a notice that read: 'A Mermaid is added to the museum – no extra charge.' Drawn by the picture and the implication of what would be seen within, many thousands of people paid their admission fee and went to see this spectacle. As Barnum said, if the shrivelled-up 'mermaid' did not meet with their expectations, the rest of the exhibits were worth the money.

Mermaids have continued to be seen in more recent years. One was seen in 1947 by a fisherman on the Hebridean island of Muck. She was sitting on a floating herring box (used to preserve live lobsters) combing her hair. As soon as she realised she was being observed she plunged into the sea. Until his death in the late 1950s the fisherman could not be persuaded to believe that he had not seen a mermaid.

In 1978, a Filipino fisherman, 41-year-old Jacinto Fatalvero, not only saw a mermaid one moonlit night but was helped by her to secure a bountiful catch. Little more is known, however, because having told his story, Fatalvero became the butt of jokes, the object of derision – and, inevitably, hounded by the media. Understandably he refused to say another word.

It is widely accepted that the mermaid legend sprang from the misidentification of two aquatic mammals, the manatee and dugong, and possibly seals. Obviously many reports can be thus explained, but does this explanation satisfactorily account for what was seen by Henry Hudson's sailors in 1608 or for the mermaid seen by the schoolmaster William Munro? Were these and other similar sightings sea-mammals or mermaids?

One suggestion, perhaps slightly tongue in cheek, is that the merfolk are real, the descendants of our distant ancestors who came ashore from the sea. The merfolk, of course, are descended from those ancestors who either stayed in the sea or chose to return to it. Human embryos have gills that usually disappear before birth, but some babies are born with them and they have to be removed surgically.

But, whatever she is, the mermaid has a long history of sightings and continues to be seen. For this we should be thankful; the romance and folklore of the sea would be all the poorer without her.

Borley: the tension mounts

Large, dark and ugly, Borley Rectory seemed to invite haunting. And with the arrival of ghost hunter Harry Price, it became a hive of paranormal activity. Was someone helping things along? FRANK SMYTH continues his examination of the Borley case

Above: the Reverend Henry (Harry) Bull and the choir of Borley church. Like his father before him, Harry Bull perpetuated the story of the haunting of the rectory by a nun

Below: the gloomy 23-room rectory as seen from the tower of the church

ALTHOUGH IT SERVED as rectory to the 12th-century Borley church, which stood amid ancient gravestones on the opposite side of the Sudbury road, the ' most haunted house in England' was only 76 years old when it burned to the ground in the winter of 1939. Borley Rectory was an ugly two-storey building of red brick, its grounds dotted with tall trees that cast gloom on many of its 23 rooms. It was built in 1863 by the Reverend Henry D. E. Bull, who was both a local landowner and rector of Borley church, to house his wife and 14 children.

Immediately behind and to one side of the house lay a farmyard bounded by a cottage, stabling and farm buildings. When an extra wing was added to the house in 1875, a small central courtyard resulted. The dining-room fireplace was carved with figures of monks, a decoration suggesting that the Rev. Bull may have believed a local legend that a 13th-century monastery had once occupied the spot. One of the monks from this monastery gave rise to the first ghost story about the site. He was said to have eloped with a nun from a convent at Bures, some 8 miles (13 kilometres) away. But the couple were caught and executed, he being beheaded and she walled up in the convent. And their ghosts haunted the area. The roots of this picturesque tale were cut away in 1938 by a letter from the Essex Archaeological Society to Sidney Glanville, one of the most diligent and

honest volunteer investigators for the ghost hunter and author Harry Price. It stated that neither the monastery nor the nunnery had ever existed.

However, there is evidence that both the Rev. Henry Bull and his son and successor as rector, the Rev. Harry Bull, enjoyed telling the story. It gained currency particularly among Sunday school children, many of whom presumably grew up believing it – in view of its source – to be 'gospel'.

Before this first 'nun's tale' was replaced by a later version, reports grew that various members of the Bull family – notably two of the sisters, Millie and Ethel – had seen a shadowy figure in the long rectory garden moving across what then became known as the 'nun's walk'. This route followed the path of an underground stream, along which clouds of gnats were inclined to drift on warm summer evenings. The two sisters told Price that they had seen the nun in July 1900, adding only that it was 'evening' and 'sunlit' – so no one can be sure it was not a formation of gnats. A later rector, the Rev. G. Eric Smith, told of being startled by a 'white figure' that turned out to be the smoke from a bonfire, while V. C. Wall, a *Daily Mirror* reporter, saw a similar apparition that proved to be the maid.

The Bull family lived at Borley Rectory in basic discomfort – without gas, electricity or mains water – for almost 65 years. When his father died in 1892, Harry took over as rector and continued to live in the house with his numerous siblings. At least three of the family remained in occupation until Harry's death in June 1927. He himself moved across the road to Borley Place when he married in 1911, but returned to the rectory in 1920, presumably after his wife's death.

Above: the summerhouse in which Harry Bull dozed away his last years. He claimed that he saw the ghostly nun and other apparitions while he rested here

Below: the place where the ghost of the nun disappears after her walk in the rectory garden. Up to this point – and where she walks – the stream is underground

Despite the architectural gloom of their surroundings, the younger Bulls seem to have been a lively crowd, according to the testimony of friends and acquaintances who contacted researchers in the late 1940s and early 1950s. The house had curious acoustics that lent themselves to practical jokes. According to Major the Hon. Henry Douglas-Home of the Society for Psychical Research, footsteps in the courtyard at the rear of the house and voices in the adjoining cottage could clearly be heard in the rectory, along with the noise made by the hand pump in the stable yard. These provided plenty of thumps and groans, he said. Another source told researchers that the young Bull sisters took a delight in telling maids that the house was 'haunted', and one old servant mentioned that after being primed in this way by Edith Bull, she had heard 'shuffling' noises outside her room.

As he grew older, Harry Bull added his own contributions to the village gossip. He appears to have had narcolepsy, a condition in which the sufferer is always drowsy, and took to sleeping for most of the day in a summerhouse. After his snoozes, he claimed he had seen the nun, heard the phantom coach in which she had eloped with the monk, and spoken to an old family retainer named Amos, who had been dead for years. By 1927, when Bull died and the family finally left the rectory, it had become a 'haunted house' in local imagination. This reputation was probably enhanced as the house lay empty and dilapidated for over a year.

On 2 October 1928, the new rector of Borley arrived with his wife. The Rev. G. Eric Smith had spent his early married life in India, but following his wife's serious illness there, he decided to return home, take holy orders, and seek a living. Desperation may

have been setting in when he accepted Borley, for he took it on trust and both he and his wife were dismayed when they discovered the condition of the rectory.

To add to their troubles during the first winter, the Smiths soon heard that the house was 'haunted'. The 'ghosts' themselves did not trouble them, however. As Mrs Smith was to write in a letter to the *Church Times* in 1945, neither of them thought the house haunted by anything but 'rats and local superstition'.

Smith's main worry was that the more nervous of his parishioners were unwilling to come to the rectory for evening meetings. When he failed to talk them out of their fears, he took what was perhaps the fatal step of writing to the editor of the *Daily Mirror* to ask for the address of a psychical research society. He hoped that trained investigators could solve the mystery in a rational way and allay the fears of the locals.

Instead, the editor sent a reporter, V. C. Wall, and on Monday, 10 June 1929, he filed the first sensational newspaper account about Borley Rectory. His story talked of 'Ghostly figures of headless coachmen and a nun, an old-time coach, drawn by two bay horses, which appears and vanishes mysteriously, and dragging footsteps in empty rooms . . . .'

The *Mirror* editor also telephoned Price, who made his first visit two days later. With Price's arrival, 'objective phenomena' began for the first time. Almost as soon as he set foot on the premises, a flying stone smashed a window, an ornament shattered in the hallway, showers of apports – pebbles, coins, a medal and a slate – rattled down the main stairs. The servants' bells jangled of their own accord and keys flew out of their locks. During a seance held in the Blue Room – a bedroom overlooking the garden with its 'nun's walk' – rappings on a wall mirror supposedly made by the late Harry Bull were heard by Price and his secretary, Wall, the Smiths, and two of the Bull sisters who were visiting the house.

Price made several trips to the house during the weeks that followed, each visit being accompanied by strange phenomena that were duly reported in the *Daily Mirror* by Wall.

The results were predictable: far from quelling his parishioners' fears, the Rev. Smith had not only unwittingly increased them but added another dimension to his catalogue of woes. The district was invaded by sightseers night and day. Coach parties were organised by commercial companies and the Smiths found themselves virtually under siege. On 14 July, distressed by the ramshackle house and its unwelcome visitors, they moved to Long Melford. Smith ran the parish from there before taking another living in Norfolk in April 1930.

Price must have been made uneasy on at least two occasions at Borley. One of these was when some coins and a Roman Catholic medallion featuring St Ignatius Loyola 'materialised' and fell to the ground at about the same time as some sugar lumps flew through

Below: the spectral nun and the phantom coach haunting the site of Borley Rectory (seen on the left). In some versions of the story, the drivers of the coach were beheaded – which accounts for the headless figures in this picture. The nun was eloping with a monk, who was hanged when the two were caught. She was bricked up into a wall, we are told

Bottom: pointing out the place where the apparitional coach vanishes

the air. When they were picked up, they were, recalled Mrs Smith, strangely warm to the touch, as if from a human hand. Her maid Mary Pearson, a known prankster, gave her the solution: 'That man threw that coin,' she explained, 'so I threw some sugar.' An even more farcical incident marked the second near-miss for Price during a further seance in the Blue Room. Heavy footsteps were heard outside; accompanied by the slow rumble of shutters being drawn back. In the doubtless stunned hush that followed, Price asked aloud if it were the spirit of the Rev. Harry Bull. A guttural voice, clearly recognisable as that of a local handyman, replied: 'He's dead, and you're daft.'

Rats, Mrs Smith later averred, lay behind the bell ringing – the bell wires ran along rafters under the roof. As for a mysterious light that 'appeared' in an upstairs window, it was well-known locally as a trick reflection of light from the railway carriages that passed along the valley.

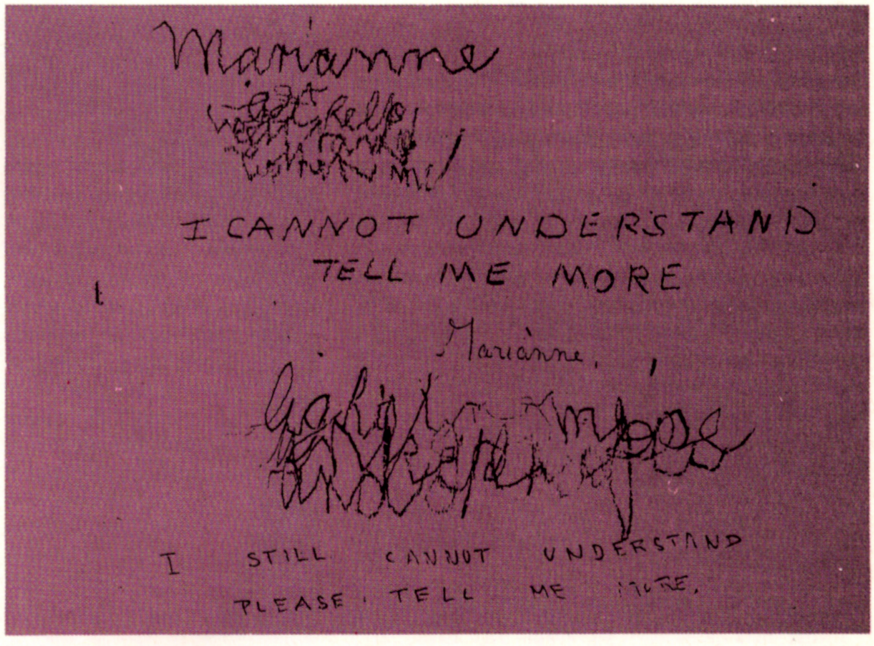
For six months after the Smiths left Borley parish, the rectory was unoccupied once more. Then on 16 October 1930 the Rev. Harry Bull's cousin, Lionel A. Foyster, moved in as the new rector. The Rev. Foyster, a man in his early fifties, had moved back home from his previous post as rector of Sackville, Nova Scotia, which he had held between 1928 and 1930. He suffered from rheumatism but, despite his painful illness, he was a kindly and well-liked man. He was deeply devoted to his attractive wife Marianne, who was 31, and their adopted daughter Adelaide, a child of about two and a half.

During the five years that the Foysters' lived at Borley, an estimated 2000 separate 'incidents' occurred, most of them within a period of about 14 months. These included voices, footsteps, objects being thrown, apparitions and messages scribbled in pencil on walls. It is probably true to say that with one possible exception, none of these could be attributable to Harry Price, who visited the rectory only once while the Foysters were there. The day after his visit, on 15 October 1931, he wrote one of the few straightforward statements he was ever to make on the Borley mystery in a letter to a colleague: '... although psychologically, the case is of great value, psychically speaking there is nothing in it.'

Six months had elapsed since the Smiths' departure and the Foysters' arrival, and in that time Borley Rectory had become more dilapidated than ever. According to her husband's cousins, the Bulls, Mrs Foyster hated the place from the moment she saw it. She made no friends locally, and her only companion, apart from Lionel, was a family friend, François D'Arles, a French-Canadian much nearer her own age. He rented the cottage at the rear of the house, and SPR investigators got the impression that he dominated the household. By 1932 Marianne Foyster and D'Arles had opened a flower shop together in London and returned to Borley only at weekends, the implication being that they had become lovers. Mrs Foyster often behaved oddly, if not hysterically, fainting when frustrated. Once she flung herself on her knees before assembled investigators to pray to St Anthony for 'vindication' when no manifestations were forthcoming – as though she expected to be able to produce them.

When the 'hauntings' of Borley Rectory began again shortly after the Foysters' arrival, the villagers accused Marianne Foyster – to her face – of being behind them.

Was Borley Rectory ever haunted? Or was it a glorified publicity stunt? See page 1918



Top: an example of the 'spirit' writing on the wall of the rectory, addressed to Marianne Foyster. Paranormal phenomena increased when the Foysters came to live at Borley

Above: Harry Price at work in his own laboratory. His investigation of the Borley haunting is one of the most controversial of his career

Left: the foot of the main stairs of the rectory, scene of a rain of apports – coins, pebbles and other materialised objects. This happened almost immediately after Price arrived

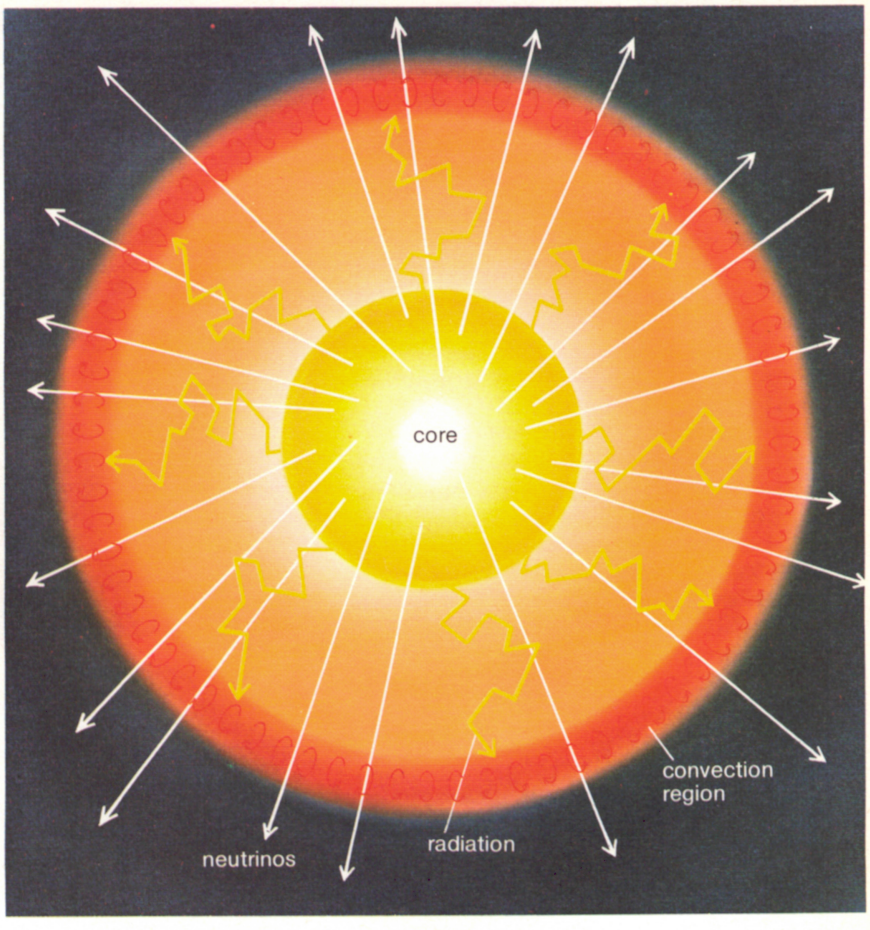
The heart of the Sun

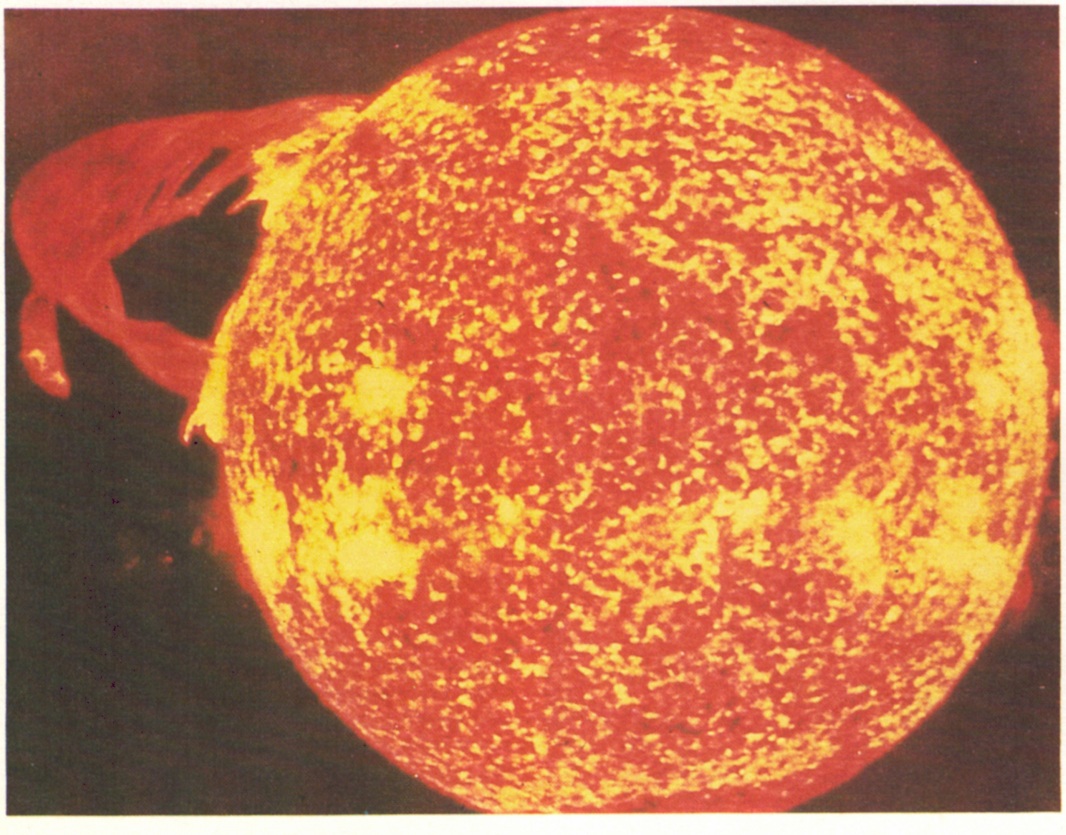
Did the Sun catch a chill a few million years ago? Has it been 'off colour' throughout mankind's existence – and will it threaten human life by warming up again? JOHN GRIBBIN discusses new evidence about the processes at the heart of the Sun

DURING THE 1930s, nuclear physics and astrophysics came into head-on collision in a debate that made headlines, even in the popular press. Physicists knew that the only processes that could keep the Sun hot were nuclear reactions. Since hydrogen is the most abundant element in the Sun, and helium the second most abundant, it was clear that hydrogen nuclei must be fusing together to make helium nuclei – a reaction that would release energy.

But according to astronomers, the centre of the Sun must be at a temperature of about 27 million degrees Fahrenheit (15 million degrees centigrade). And the nuclear physicists said that, according to their most reliable theories, this temperature was too low to permit the hydrogen fusion reaction to sustain itself.

Confident that, whatever the nuclear physicists might say, the Sun continues to shine steadily as it has done for millions of years, the pioneering astrophysicist Arthur





Above: the solar powerhouse is a relatively small region at the centre of the Sun. Four million tonnes of matter are annihilated and converted into energy every second in nuclear reactions. Some of this energy appears in the form of neutrinos, which flood outwards at the speed of light, unimpeded by the Sun's matter. Heat, light and other radiation take a million years to struggle out through the Sun's middle layers. In the outer layers heat is transferred by convection: hot gas moves outwards, radiates heat and light into space, cools and moves inwards again

Left: hotter and cooler areas on the Sun appear as brighter and darker patches when viewed through an ultraviolet light filter

Eddington is reported to have told his colleagues to 'go and find a hotter place' – a polite way of telling them to go to hell!

In due course the nuclear physicists found that their theories were incomplete; improved theories showed how the fusion reactions could indeed go on inside the Sun, with no need for a 'hotter place'. Those improved theories led eventually to the hydrogen bomb and now point the way towards taming the power of the Sun in fusion reactors on Earth.

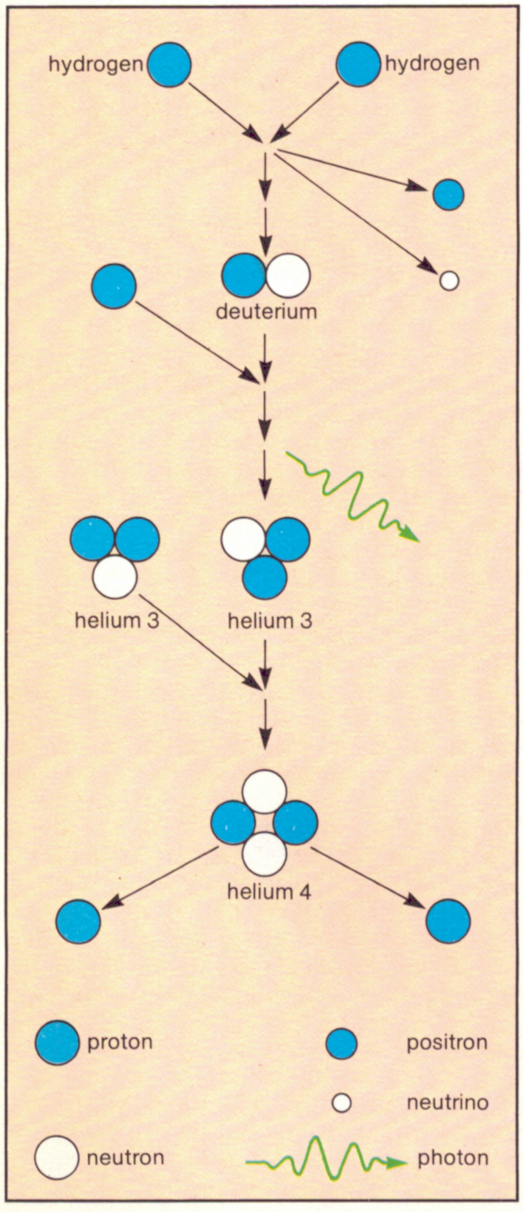
Today a new mystery surrounds the nuclear physics that describes conditions inside the Sun and the reactions that go on there. Those same equations that successfully explain how the Sun's heat is maintained predict that a flood of particles called neutrinos should be streaming out of the Sun and across space towards the Earth and beyond: but the neutrinos, or most of them, are missing. Once again there is a head-on clash between observation and theory.

The Sun began its life as a large, cool cloud of gas. It was made chiefly of hydrogen and helium, which have the simplest of all atoms. But it contained a smattering of elements with heavier atoms, debris from earlier generations of stars. The cloud collapsed and as it did so its centre warmed up. It was warmed first by the release of gravitational energy (just as water at the foot of Niagara Falls is warmed by its fall) and then by the nuclear 'burning' of hydrogen.

Originally the Sun was approximately 25 per cent helium and 75 per cent hydrogen. These figures are not exact, and a small proportion of heavier elements was also present. The Sun has been converting hydrogen into helium for nearly 5000 million years since then. Today in the centre of the Sun the proportions are nearly reversed: 65 per cent helium and 35 per cent hydrogen.

How can we be so sure? The basis for these statements is the success of our 'models', or theories, of stellar evolution. From a given original mass of a star, the proportions of the original hydrogen-helium mix, and the laws of physics, the model predicts how the star will 'evolve' as it burns its fuel. The calculations require powerful computers: they are regarded as successful because they successfully 'predict' the sizes and temperatures that stars – and especially the Sun – are observed to have.

The picture of the Sun's interior that is provided by our present knowledge is a dramatic one. Half of the total mass lies close to the centre – inside a sphere with a quarter of the Sun's radius, or just 1.5 per cent of the total volume. In this tiny volume 99 per cent of the Sun's energy is released, and conditions are extreme indeed: the temperature



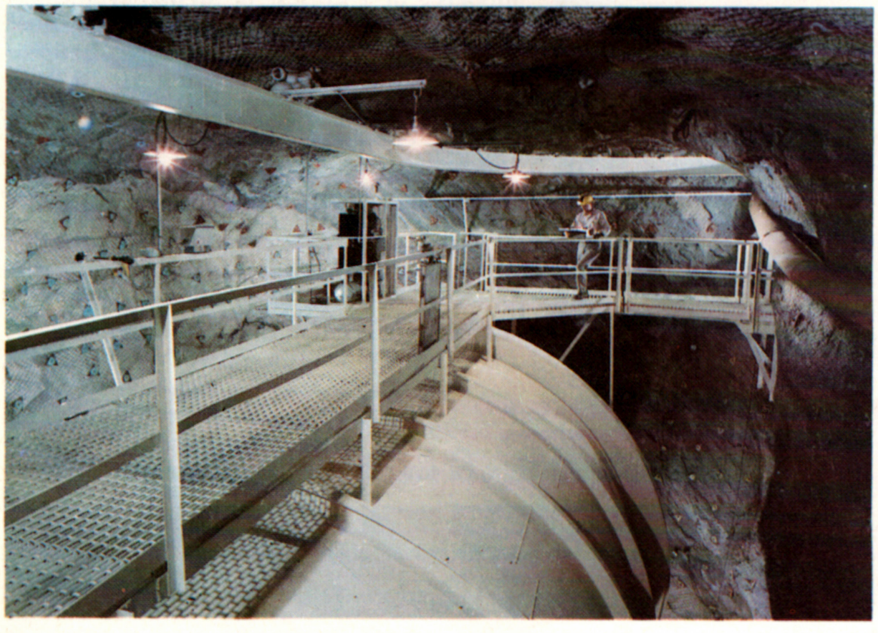
Below left: how the Sun 'burns'. At the high temperatures and pressures in the Sun, atoms are stripped of their outer electrons. The atoms' nuclei, made of positively charged protons and uncharged neutrons, collide continually. Hydrogen nuclei (single protons) are built up in a series of steps to form more complex nuclei. This can happen in a variety of ways. In the sequence shown here, deuterium ('heavy hydrogen') is formed, while a positron (a positively charged electron) and a neutrino are emitted. Then helium 3 ('light' helium) is formed, and a photon – a 'packet' of electromagnetic energy – is given out. Nuclei of helium 3 collide to form ordinary helium 4, releasing two protons

Below: the Helix Nebula, an enormous globe of gas, shows us the fate of the Sun in the far future, as its nuclear fires die. First the Sun will become a 'red giant'. Then its outer layers will swell, engulfing the Earth, and ultimately the entire solar system

is close to 27 million degrees Fahrenheit (15 million degrees centigrade), as we have seen, and the density is 12 times that of lead – yet the material of the Sun's centre is still a fluid, not a solid.

The temperature and pressure prevailing here support the vast weight of the overlying matter. The Sun's mass is one third of a million times that of the Earth. Occupying a volume that could comfortably accommodate 1,300,000 Earths, however, this gives rise to an average density only 1.4 times that of water.

It is surprising that any particle can escape from the depths of the Sun. Yet the neutrino is such an elusive particle that it does just that. The neutrino has no electrical charge; it is not known whether it has zero mass, as long believed, or a very small mass. The chance of a neutrino interacting with any other particle it meets is incredibly small: the result is that it behaves like a ghost, able to slip through immense quantities of matter without any effect whatever. Neutrinos created by nuclear reactions at the Sun's core fly outwards at the speed of light – scarcely noticing the surrounding matter, which has a maximum density of 4.5 tonnes per cubic foot (160 tonnes per cubic metre) – and some of them reach the Earth just eight minutes later. In fact 26,000 million neutrinos pass through each square inch (4000 million per square centimetre) of the Earth, or of our bodies, in every second. An infinitesimal fraction of them react with particles in the atoms they meet.



The first solar neutrino detector, at the bottom of a gold mine in South Dakota, USA. Since it has come into use it has registered fewer neutrinos from the depths of the Sun than theorists had expected

Astrophysicists have measured the intensity of this flood of neutrinos with special detectors. Paradoxically these 'neutrino telescopes', designed to study the heart of the Sun, are built deep underground. The purpose of this is to screen out other forms of radiation – cosmic rays and background radioactivity. To be sensitive enough to interact with the neutrinos the detectors have to be very large. The world's first solar neutrino detector, as big as a swimming pool, was built at the bottom of a gold mine in South Dakota, USA. The tank was filled with perchloroethylene – dry cleaning fluid. It contained a high proportion of chlorine, with which one of the billions of passing neutrinos would occasionally interact. The interaction would lead to the emission of an electron, which can easily be detected. In the 100,000 gallons (400,000 litres) of the fluid the experimenters calculated that they would catch some 25 neutrinos each month. In fact they observed on average only eight solar neutrinos each month.

The earliest experiments failed to detect *any* neutrinos and some theorists suggested that the Sun might have gone out – the reactions in its centre had ceased but the surface had not yet cooled off.

The solar pinball machine

If this were true, it would take about one million years for the surface to go cold. That is the time it takes electromagnetic energy – light, ultraviolet radiation, and X-rays – to work its way outwards from the centre. The radiation bounces from electron to electron in the densely packed matter at the Sun's core, like a ball bouncing in a pinball machine.

Now that neutrinos have been detected, we know that the Sun has not gone out. But since they are fewer than expected, it may be that the Sun has 'gone off the boil' and cooled off a little at the centre.

If the temperature were 10 per cent lower than the astrophysicists expected the low neutrino intensity would be accounted for. But this temperature is too low to keep up the observed output of heat and light from the surface. It could only be a temporary departure from the Sun's normal long-term state. This raises intriguing possibilities. Has the Sun been off colour for the past few million years? If so, could that possibly tie in with the recent spate of ice ages that has afflicted the Earth during roughly that time?

In the 1930s the physicists had to change their ideas to account for what the astronomers knew of the conditions inside the Sun. The boot may now be on the other foot. The astronomers may have to revise their notions of how stars work to take account of the physicists' knowledge of nuclear reactions. For the standard theories do not admit the possibility of stars varying – temporarily, we hope – in this way.

But should we hope for a return to 'normal'? After all, human beings emerged only during the last million years or so. The conditions on Earth that we regard as normal – ice ages included – may be due to a temporary misbehaviour of the Sun. If so, a return to the Sun's 'normal' state might mean a return to the tropical conditions in which dinosaurs dominated the Earth!

Further reading

R.J. Bray and R.E. Loughhead, *Sunspots*, Dover 1979
H.J. Eysenck and D.K.B. Nias, *Astrology: science or superstition?*, Maurice Temple Smith 1982
John Gribbin, *The strangest star*, Fontana 1980
Guy Lyon Playfair and Scott Hill, *The cycles of heaven*, Pan 1979

Post script

Your letters to THE UNEXPLAINED

Dear Sir,
In July 1979, when I was on holiday in Maryland, USA, I had a UFO sighting. It started when my cousin Lisa spotted a silver object high in the sky. However, it seemed fairly unremarkable and, not paying much attention, we continued to play ball. As the sky gradually grew darker, the object became clearer, and lit up. Dusk had fallen by now, so my cousin Jason decided to fetch a spotlight and make signals to the object. At an incredible speed, the object came at us. There it was, huge, domed, with brightly coloured revolving lights. We stood, stunned, for some seconds, and then ran into the house. After a while we ventured out again, and this time were caught in the beams of two giant spotlights. This time when we ran inside it was for good!

Interestingly enough, next morning, there was an article in the *Washington Times* saying that there had been a number of reports of radiation burns from an area not far from the Capitol.

I know I saw an alien craft that night. But why, I wonder, didn't the occupants beam us up into their spaceship? I'm sure that, with their technology, they could easily have done so. I shall never forget that 'alien craft' – it was beautiful. What intelligence those creatures must have – probably more than we shall ever know!

Yours faithfully,
Amantha Jones (age 14) Liverpool

Dear Sir,
I should like to tell you about a paranormal experience I had in 1974. It seems unusual to me in that I was not the only person involved.

It happened when my sister Lynne and myself – 13 and 14 years old, respectively, at the time – were in our bedroom one afternoon, about two o'clock. We were about to set off on our school summer holidays and were starting to pack. All of a sudden I was overcome by a strange sensation of lightness; my sister complained of the same feeling, so we both went and lay down on our beds. Suddenly we found ourselves on a hillside with vast rugged hills surrounding us. It was dark; the only natural light came from behind some distant mountains. I couldn't tell whether it was daybreak or sunset. There was a light breeze, and we were both standing ankle-deep in snow; I could see my sister standing beside me. My attention was caught by a strange-looking building that stood in front of us. I told my sister – in thought – to stay where she was, and walked down the hill towards the brightly lit building. I stopped when a man emerged from the darkness and crossed my path. Luckily he did not appear to have seen me – he was wearing what looked like some kind of army uniform, and carrying a rifle on his shoulder. He disappeared into a small building to my left, from which came the sound of music and laughter – I presume it was some kind of house where the soldiers went when off duty. To my right there was a similar building, and guards with dogs patrolling a high fence. I turned my attention to the main building and looked inside. Amazingly, the interior seemed larger than seemed possible from the outside. I realised that it was built into the hillside and went deep underground

The room I found myself in contained several white-coated men who were standing over a mass of switches, dials and lights, taking notes. All the walls were covered with controls, and in the centre of the room was a large, bulky-looking machine rather like a giant telescope that penetrated the back wall of the room. The front part of the machine started to move forwards on a rail; it had a dull, glowing centre. When I moved forwards to find out more, I was stopped by a tingling sensation rather like static electricity. I had the strange idea that the machine was an electronic laser of some kind – and as soon as this idea had occurred to me, I found myself back in my room, lying on my bed. Lynne and I discussed our experiences later that day, and found that they were the same. We came to the conclusion that we had 'visited' a Russian base somewhere in the steppes: we had heard the white-coated men speak, and it seemed to us that they were speaking Russian.

Lynne and I decided not to tell anyone about this incident: at the time it did not seem to us to be very extraordinary – I had had a number of paranormal experiences previously, so I suppose I had grown used to them. Now, however, our experience does seem remarkable, and I would be interested to know if any other readers have had similar experiences of shared astral projection.

Yours faithfully,
J. Taylor (Miss) Hull, North Humberside

Dear Sir,
First of all I must congratulate you on your publication *The Unexplained*. I especially enjoy reading Postscript – it is refreshing to know that other people experience things that they, and modern science, cannot explain.

I should like to tell you of an incident that afterwards shocked me. It started on Saturday, 30 April 1977, when I was living in Cambridgeshire. Most Saturdays, I would make the journey from Peterborough to Cambridge on a local bus. On my way, that particular Saturday, I broke my journey in Huntingdon to visit a friend who had just moved to a nearby village. I returned to Huntingdon in good time to catch the bus to Cambridge – but, to my anger, when the bus came it drove straight past the bus stop. I made my way back to the bus station to report the incident, when something very strange happened. A thought came into my head, followed by a vision – a feeling that a disaster would happen in the town soon, then a picture of an aeroplane.

I thought no more of the incident until three days later – on Tuesday, 3 May – when the local television news programme *Look East* reported that three airmen and three children had died when an RAF Canberra had gone out of control and crashed into a row of houses on the Oxmore estate in Huntingdon.

As you can imagine, I was shocked, first at the accident and secondly by the fact that I seemed to have been forewarned of it. Could it be that my heightened emotional state – of anger – at the time of the vision made me receptive to such a 'message'?

Yours faithfully,
Colin Boon Banbury, Oxfordshire

Send *your* letters to THE UNEXPLAINED, Orbis House, 20–22 Bedfordbury, London WC2N 4BT

Is this the corpse of a bigfoot? One expert on these elusive animals examined it, took these pictures, and believes it is

Signs and wonders

A preview of some of the intriguing new series appearing soon in *The Unexplained*

Beware the tall dark stranger
For thousands of years people have tried to discover what the future has in store for them. We devote a major new series to the world's most widely used systems of divination – how they work, and what they mean. **See issue 96**

The tale of the talking mongoose
On a remote farm on the Isle of Man in the 1930s there appeared, the newspapers said, a mongoose that could talk. Very few people had actually seen it, but psychical researchers raced to the scene to uncover an increasingly bizarre story. You can find out what they discovered in **issue 97**

An idea out of the air
When we think, we use our brains. And thinking often involves the use of memory. Isn't it obvious, then, that memories are stored in our brains? Not so, says Dr Rupert Sheldrake, and he applies his theory of morphogenesis to show that memories may, in fact, be stored outside the body. **See issue 98**

The mystery of the Minnesota iceman
Around the fairgrounds of the northern United States a small-time showman trundles a body encased in ice. Is it the corpse of a bigfoot? Expert Bernard Heuvelmans believes it is. The story – with photographs – starts in **issue 98**

Myth and magic at Glastonbury
The place where King Arthur lay buried – a centre of dragon myths and earth mysteries – the English town that Christ himself is said to have visited. What truth is there in these extraordinary legends? **See issue 99**

The most monstrous cover up of all?
From time to time stories circulate about flying saucers that have crashed, of alien bodies being preserved in secret government bases. If they are true, an outrageous cover up has been foisted on the public. If they are not, what lies behind them? **See issue 100**

The princess who never was?
When the Bolsheviks killed the Russian Tsar in 1918, they believed they had wiped out his entire family too. But in 1920 a girl appeared in Berlin claiming to be his daughter Anastasia. True or false? **See issue 101**